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मानक

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“पुराने को छोड़ नये के तरफ”

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“Step Out From the Old to the New”

IS 3116 (2002): Sealing Compound for Lead-acid Batteries
(Bitumen Based) [PCD 6: Bitumen Tar and their Products]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक
सीसा अम्ल बैटरियों का सील बन्दी
यौगिक (बिटूमेन आधारित) — विशिष्टि
(पहला पुनरीक्षण)

Indian Standard
SEALING COMPOUND FOR LEAD-ACID
BATTERIES (BITUMEN BASED) — SPECIFICATION
(*First Revision*)

ICS 29.220; 75.140; 91.100.50

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Bitumen, Tar and Their Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This Indian Standard was first published in 1965. The Bureau has already published several Indian Standards* on various types of lead acid batteries. This standard was especially formulated to cover sealing compound for storage batteries.

Through the use of this standard, it was experienced that sealing compound, though conforming to the requirements prescribed in IS 3116 : 1965 version, was developing cracks during its use. Seepage of electrolyte through these cracks were damaging the outer steel box containers. Therefore, in this revision, additional performance tests like adhesiveness, ductility and contraction have been included to improve the quality of product. Modification in the requirements of penetration and softening point have also been incorporated to make them more stringent. The title of the standard has also been modified as 'Sealing Compound for Lead-Acid Batteries (Bitumen Based)'.

While no specific requirements have been laid down for toxicity of the material, it is recommended that the material shall not emit toxic fumes when gets heated during use.

In the preparation of this standard, assistance has been derived from IND/SL/8103 'Compound sealing batteries' issued by the Ministry of Defence, Government of India.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

The composition of the committee responsible for formulation of this standard is given in Annex F.

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- * IS 1145 : 1980 Lead-acid storage batteries for motor cycles, auto rickshaws and similar vehicles (*second revision*)
IS 1146 : 1981 Rubber and plastic containers for lead-acid storage batteries (*second revision*)
IS 1651 : 1991 Stationary cells and batteries, lead-acid type (with tubular positive plates) (*third revision*)
IS 1652 : 1991 Stationary cells and batteries, lead-acid type with plante positive plates (*third revision*)
IS 5154 : 1990 Lead-acid traction batteries (*first revision*)
IS 6304 : 1992 Stationary batteries lead-acid type with pasted positive plates (*second revision*)
IS 6848 : 1979 Lead-acid batteries for train lighting and air-conditioning services (*first revision*)
IS 7372 : 1995 Lead-acid storage batteries for motor vehicles (*first revision*)
IS 7624 : 1990 Lead-acid starter batteries for diesel locomotives and railcars (*first revision*)
IS 7660 : 1988 Lead-acid batteries for electric locomotives and electrical multiple units (*first revision*)
IS 9814 : 1981 Lead-acid storage batteries for marine use
IS 12013 : 1987 Lead-acid batteries for 110 volts train lighting system with monobloc containers
IS 13369 : 1992 Stationary lead-acid batteries (with tubular positive plates) in monobloc containers
IS 13514 : 1992 Lead-acid batteries for electrical road vehicles
IS 13568 : 1992 Lead-acid light weight storage batteries for motor-cycles and similar vehicles fitted with ac circuitry
IS 14257 : 1995 Lead-acid storage batteries for motor vehicles with light weight and high cranking performance

Indian Standard

SEALING COMPOUND FOR LEAD-ACID BATTERIES (BITUMEN BASED) — SPECIFICATION (First Revision)

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for bitumen based sealing compound for lead-acid batteries.

2 NORMATIVE REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
245 : 1988	Trichloroethylene, technical (<i>third revision</i>)
266 : 1993	Sulphuric acid (<i>third revision</i>)
334 : 2002	Glossary of terms relating to bitumen and tar (<i>third revision</i>)
1201 : 1978	Methods of testing tar and bituminous materials; Sampling (<i>first revision</i>) (IS 1201 to IS 1220 in one volume)
1203 : 1978	Methods of testing tar and bituminous materials; Determination of penetration (<i>first revision</i>)
1205 : 1978	Methods for testing tar and bituminous materials; Determination of softening point (<i>first revision</i>)
1208 : 1978	Methods for testing tar and bituminous materials; Determination of ductility (<i>first revision</i>)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 334 shall apply.

4 REQUIREMENTS

4.1 Test for Adhesion

The adhesion of the material expressed in kg pull to break, shall not be less than 25 kg when tested by the method described in Annex A.

4.2 Test for Contraction

The contraction of the material shall not exceed 8 percent when tested by the method described in Annex B.

4.3 Test for Ductility

Ductility of the material expressed in centimetre elongation, shall be not less than the values shown in Table 1 when tested by the method described in IS 1208.

Table 1 Ductility Values

Test Temperature, °C (1)	Elongation, <i>Min</i> , cm (2)
25	3
4	2

4.4 The material shall also comply with the requirements given in Table 2.

**Table 2 Requirements of Sealing Compound
for Lead-Acid Batteries
(Clauses 4.4 and 4.5)**

Sl No.	Characteristics	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Penetration, at 25 °C, 100 g 5 s, in 0.1 mm	17 to 45	IS 1203
ii)	Softening point, °C	90 to 110	IS 1205
iii)	Matter insoluble in trichloroethylene, percent by mass, <i>Max</i>	1	Annex C
iv)	Resistance to sulphuric acid	To pass test	Annex D

4.5 Keeping Quality

The material when stored in original and closed containers shall continue to satisfy the requirements given in Table 2 for a minimum period of 2 years from the date of manufacture.

4.6 Tests Performed on Material Prior to Application

4.6.1 The material shall not emit excessive fumes when heated to 80 °C and there shall be no formation of gas pockets, cracks or pitted surfaces on cooling.

4.6.2 Deformation at Low Temperatures

If required by the purchaser, the material shall not crack or deform when kept at a temperature of 10°C for one hour.

5 PACKING AND MARKING

5.1 Packing

The material shall be packed in suitable containers as agreed to between the purchaser and the supplier. The supplier shall provide the instructions for use and precautions to be followed.

5.2 Marking

The containers shall be marked with the following information:

- a) Name of the material,
- b) Indication of the source of manufacture,
- c) Month and year of manufacture,
- d) Batch number, and
- e) Net mass of contents.

5.2.1 The containers may also be marked with the Standard Mark.

5.2.1.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 SAMPLING

6.1 Representative samples of the material shall be drawn as prescribed in Annex E.

6.2 Number of Tests

Tests for determination of all the requirements of the specification given in 4 shall be performed on each of the individual samples separately.

6.3 Criteria for Conformity

A lot shall be declared as conforming to the requirements of this specification, if the different test results as obtained in 6.2 satisfy the corresponding requirements given in the standard.

ANNEX A

(Clause 4.1)

DETERMINATION OF ADHESION

A-1 PROCEDURE

Two hard rubber discs, each with a surface area of 13 cm^2 and mounted on steel shafts, shall be arranged facing each other 5.0 mm apart. A phenolic cylinder with a 1.30 cm section removed shall be used as a spacer and retainer for the compound which shall be heated and poured between the discs. The discs and the spacers shall be pre-heated for one hour at 65°C , before pouring the compound, and the inner surface of the phenolic cylinder shall be coated with a thin film of grease before pouring. The edges of the spacer

shall be forced apart to allow for the internees of the discs with no acquisition of grease. The compound shall be poured at the pouring temperature specified by the manufacturer (*see Note*). After pouring, the assembly shall be allowed to cool to 25°C , and shall then be pulled apart at the rate of 1.30 cm/min. The testing apparatus is illustrated in Fig. 1.

NOTE — Generally pouring temperature for the compound shall be about 170°C .

A-2 REPORT

Report the adhesion of the compound pull to break.

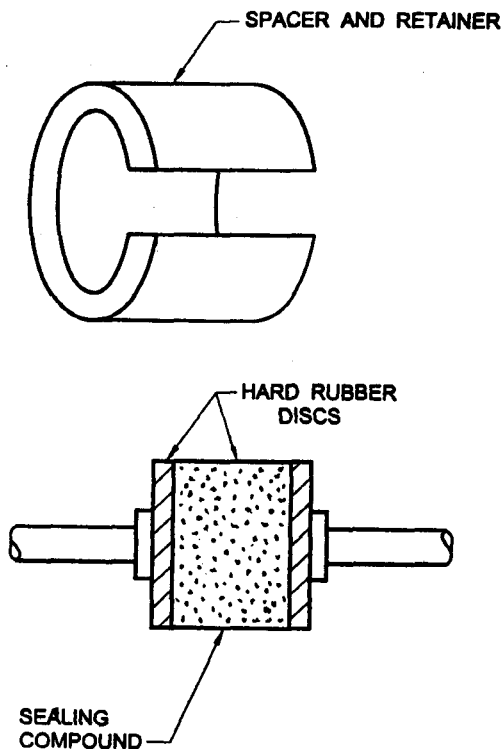


FIG. 1 ARRANGEMENTS FOR ADHESION TEST

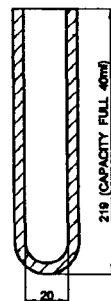
ANNEX B

(Clause 4.2)

DETERMINATION OF CONTRACTION

B-1 PROCEDURE

B-1.1 Contraction is measured by using a glass tube of 40 ml nominal capacity and 20 mm internal diameter, having flat ground edges (*see* Fig. 2). The tube is heated to 150°C, slightly, over-filled with the compound under test, also pre-heated to this temperature and maintained at 150°C ± 1°C for one hour. At the end of the period, the compound is levelled to the top of the tube by means of a heated metal spatula. The compound filled tube is then immediately transferred to the laboratory bench and cooled to a temperature of 20°C ± 1°C. In order to control the rate of cooling, the tube is enclosed throughout this period, in a draught screen. This screen is 228 cm to 254 cm high and may be a cylinder of 152 mm to 178 mm sides; the top is covered. If the laboratory temperature exceeds 21°C after cooling in air to the laboratory temperature, the tube is immersed in a water bath and cooled to a temperature of 20°C ± 1°C. The temperature measurements are taken with a thermometer immersed in another similar tube of compound, which is submitted simultaneously to the same heating and cooling cycles as the compound under test.



All dimensions in millimetres.

FIG. 2 GLASS TUBE FOR CONTRACTION TEST

B-1.2 Care shall be taken to ensure that the compound is free from internal cavities after cooling to 20°C and that the pipe formed in the compound as the result of cooling it in air to 20°C is filled with methylated spirit from a burette. The volume of spirit required to fill the pipe is noted. From the figure obtained, percentage concentration is calculated.

NOTE — The co-efficient of expansion of the compound is of the order of 0.000 55/°C on the volume at 20°C.

B-2 REPORT

Report the contraction.

ANNEX C

[Table 2, Sl No. (iii)]

DETERMINATION OF MATTER INSOLUBLE IN TRICHLOROETHYLENE

C-1 REAGENTS

C-1.1 Trichloroethylene

Conforming to IS 245.

C-2 PROCEDURE

Weigh accurately about one gram of the material in 100 ml beaker and warm the material on a water bath and mix thoroughly with 100 ml of hot trichloroethylene at 70°C ± 5°C. Allow the solution to boil for 10 min and stop heating the water bath. After 20 min, decant the supernatant liquid continuously, avoiding any disturbance of the sediment, through a filter paper (Whatman No. 5 or its equivalent). Treat the residue in the beaker again with 100 ml of hot trichloroethylene and allow the

residue to settle for 5 min. Filter the solution through the same filter paper. Wash the residue with 200 ml hot trichloroethylene. Dry the residue in an oven at a temperature of 100°C ± 2°C until constant mass is obtained.

C-3 CALCULATION AND REPORTING

C-3.1 Calculate and report the matter insoluble in trichloroethylene as follows:

Matter insoluble in trichloroethylene, percent by mass $= \frac{m}{M} \times 100$

where

m = mass in g of the residue obtained, and

M = mass in g of the material taken for test.

ANNEX D

[Table 2, Sl No. (iv)]

RESISTANCE TO SULPHURIC ACID**D-1 REAGENT****D-1.1 Sulphuric Acid**

Conforming to battery grade (dilute) of IS 266.

D-2 PROCEDURE

D-2.1 Take one gram of the material in a 250 ml beaker

containing 100 ml of sulphuric acid maintained at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Keep for 24 h and compare its colour with the colour of the original sulphuric acid.

D-2.2 The material shall be taken to have passed the test, if there is no change in the colour of the acid.

ANNEX E

(Clause 6.1)

SAMPLING OF SEALING COMPOUND FOR LEAD-ACID BATTERIES**E-1 GENERAL REQUIREMENTS OF SAMPLING**

E-1.1 Samples shall not be taken in exposed place.

E-1.2 Precautions shall be taken to protect samples, the material being sampled, the sampling instruments and the containers for sampling from adventitious contamination.

E-1.3 Samples shall be placed in suitable, clean, dry and air-tight glass containers.

E-1.4 Each sample container after filling shall be sealed air-tight and marked with full identification particulars, such as sample number, the date of sampling, indication of the source of manufacture, batch number, and month and year of manufacture.

E-1.5 Samples shall be protected from excessive variations of temperature.

E-2 SCALE OF SAMPLING**E-2.1 Lot**

All the containers of the same size and from a single batch of manufacture in a consignment shall constitute a lot. If a consignment is declared or known to consist of different batches of manufacture or of different sizes of containers, the containers of the same size and from the same batch of manufacture shall be grouped together and each such group shall constitute a separate lot.

E-2.2 The number of containers n to be selected from a lot shall depend upon the size of the lot N and shall be in accordance with Table 3.

Table 3 Number of Containers to be Selected for Sampling
(Clause E-2.2)

Lot Size, N	No. of Containers to be Selected, n
(1)	(2)
Up to 20	3
21 to 40	4
41 to 80	5
81 to 120	6
121 to 200	8
201 and above	10

E-2.3 The containers shall be selected at random and in order to ensure the randomness of selection, random number tables shall be used. In case such tables are not available, the following procedure may be adopted:

Start from any container, count them in one order as 1, 2, 3..., etc, up to r and so on, where r is the integral part of N/n (N being the lot size and n being the number of containers to be selected). Every r th container so counted shall be withdrawn to give samples.

E-3 PREPARATION OF TEST SAMPLES AND REFEREE SAMPLE

E-3.1 From each of the containers selected in E-2.3, a sample fully representative of the material in the container shall be drawn by a suitable sampling instrument. Helpful guidance in regard to precautions can be obtained from IS 1201.

E-3.2 The amount of material to be sampled in E-3.1 from the container shall be at least three times the material required for carrying out a complete series of tests given in this specification.

E-3.3 The material taken from each container shall be divided into three equal parts each forming an individual sample. One set of individual samples representing the n containers selected shall be marked for the purchaser, another for the supplier and third for the referee.

E-3.4 All the samples shall be transferred to separate sample containers. These containers shall then be sealed air-tight and labeled with full identification particulars given in E-1.4.

E-3.5 The referee sample consisting of set of n individual samples representing the n containers selected bear the seals of both the purchaser and the supplier. They shall be kept at a place as agreed to between the two and shall be used in case of any dispute.

ANNEX F

(Foreword)

COMMITTEE COMPOSITION

Bitumen, Tar and Their Products Sectional Committee, PCD 6

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Amendments Issued Since Publication

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